

The Caudal Styles of Insects Sense-organs, i. e. Abdominal Antennæ.

By Dr. A. S. PACKARD, Jun.

Dr. Anton Dohrn has published a note, in the 'Journal of the Entomological Society of Stettin' (1869), to the effect that the abdominal appendages of the female of the mole-cricket (*Gryllotalpa*) are true sensory organs (Tastorgane).

In the 'Proceedings of the Boston Society of Natural History,' May, 1866, the writer states that "while, as we have shown above, the genital armour of insects is not homologous with the limbs, there are, however, true jointed appendages attached to the ninth or tenth abdominal ring, or both, which are often antenniform, and serve as sensorio-genital organs in most [many] Neuroptera and Orthoptera" (p. 290).

In the same 'Proceedings' for February 26, 1868, he thus writes: "Regarding the insect as consisting of two (fore and hind) halves, the two ends being, with this view, repetitions of each other, these anal stylets may be considered as abdominal antennæ, so that the antennæ look one way, and their homologues, the many-jointed antenniform anal stylets, the opposite" (p. 398).

The subject is also referred to in the 'Guide to the Study of Insects,' p. 17; and the remarkable antenniform abdominal appendages of *Mantis tessellata* are figured in illustration.

I have been able to detect sense-organs (probably endowed with the sense of smell) in the short, stout, jointed anal stylets of the cockroach (*Periplaneta americana*), beautifully mounted by Mr. E. Bicknell, having recently, after reading Dr. Dohrn's note, observed the sense-organs and counted about ninety* minute sacs on each stylet, which are probably smelling or auditory organs, such as are described by Hicks (see 'Guide,' p. 26). They are much larger and much more numerous than similar sacs in the antennæ of the same insect, and are situated in single rows on the upperside of each joint of the stylets. During the breeding-season a peculiar odour is perhaps emitted by the female, as in vertebrate animals; and it is probable that these caudal appendages are endowed with the sense of smell rather than of hearing, that the male may smell its way to its partner. This is an argument that the broadly pectinated antennæ of many moths are endowed rather with the sense of smelling than of hearing, to enable the males to smell out the females. I have observed the same organs in the lamellæ of the antennæ of the carrion-beetles, which undoubtedly depend more on the sense of smell than that of touch or hearing to find stinking carcases in which to place their eggs.—*American Naturalist*, vol. iv. Dec. 1870.

* Mr. Bicknell has counted more carefully than I did the exact number of these pits, and made out ninety-five on one stylet and one hundred and two on the other, adding, "there were none on the underside of their appendages that I could see."